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ABSTRACT

In order to individualize instruction for learning disabled students, tasks should be matched to students' abilities and learning styles. Two types of task modifications include modifying the task content to coincide with what students are ready to learn and modifying task processes and features to match how students prefer to learn. Readiness assumes that students must possess the basic skills, and determining if this is so involves three processes: analyzing the task to determine process and needed instructional modification; evaluating the student's previous learning opportunities to explain performance and suggest intervention; and consulting the child about how he/she solves a particular task. Once the content of the task is determined, the student's learning style or approach should be examined. Possible areas of study for the learning disabled child include attention control, internal versus external cognitive styles, slow information processing, overloading with certain types or amounts of practice, modality strengths and weaknesses, impulsivity-reflectivity, need for directed instruction, and need to be taught learner strategies. Learning progress is maximized when classroom tasks are well matched to what the child is ready to learn and how the child prefers to learn. (CL)

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MATCHING INSTRUCTIONAL TASKS TO STUDENTS' ABILITIES AND LEARNING STYLES

How can we discover precisely what and how our students need to be taught? This paper suggests that a critical part of the evaluation and planning process for learning disabled children involves analyzing students' abilities and learning styles on instructional tasks actually expected of them within the classroom. Since learning disabilities can be aggravated or ameliorated by the nature of our instructional tasks, it is critical that we continually assess the appropriateness of these tasks and how they can be modified so as to best meet our students' learning needs. This involves analyzing the content of academic tasks and the learning processes that they require of the child. If these content and process dimensions can be suitably matched to what the child is ready to learn and how he or she best learns, then learning becomes a happier, more efficient, and less effortful process.

Matching tasks to children's abilities and learning styles is not new. This process originated with such pioneers in learning disabilities as Cruickshank, Strauss, Werner, Lehtinen, Fernald and Kirk. These pioneers' influences continue to be apparent in today's research emphases and the growing translation of research findings into more sophisticated individualized classroom instruction methods. We are struck by the wisdom of the pioneering work in learning disabilities as we discover for ourselves that matching instruc-

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tional methods and materials to our students' individua characteristics is easier said then done. We find that since each learning disabled child is unique, a teacher must adapt most materials and teaching strategies before he or she even begins to teach.

Matching tasks to children's needs is still more an art than a science. Research on these matches, or what we call "aptitude by treatment interactions", has taught us that assessment of child-task matches is an individualized, ongoing process for several reasons: not all methods work for all children (Alley & Deshler, 1979; Hagan 1971; Wheeler & Dusek, 1973); the same method does not work on all tasks for any one child (Levin, 1976); and the same materials or methods may, after some time, no longer work for a given child. Consequently, teachers need to continually ask themselves: "In which ways must I change what I am expecting my student to learn, and how I am asking him or her to learn it?"

The "Animal School" story, repinted below, humorously illustrates what can happen when child and program characteristics are mismatched. Like the animals, when a child must learning something that he or she is not ready to learn, or learn it in a way that is not natural, the child is apt to fail. This failure experience may in turn affect achievement in other academic and social areas as well.

The following pages will highlight some important child and task attributes that need to be considered when planning

The Animal School

Once upon a time, the animals decided they must do something heroic to meet the problems of "a new world." So they organized a school.

They adopted an activity curriculum consisting of running, climbing, swimming, and flying. To make it easier to administer the curriculum all the animals took all the subjects.

The duck was excellent in swimming, in fact better than his instructor; but he made only passing grades in flying and was very poor in running. Since he was slow in running, he had to stay after school and also drop swimming in order to practice running. This was kept up until his web feet were badly worn and he was only average in swimming. But average was acceptable in school so nobody worried about that except the duck.

The rabbit started at the top of the class in running, but had a nervous breakdown because of so much make-up work in swimming.

The squirrel was excellent in climbing until he developed frustration in the flying class where his teacher made him start from the ground up instead of from the tree top down. He also developed a "charlie horse" from over-exertion and then got C in climbing and D in running.

The eagle was a problem child and was disciplined severely. In the climbing class he beat all the others to the top of the tree, but insisted on using his own way to get there.

At the end of the year, an abnormal eel that could swim exceedingly well, and also run, climb, and fly a little, had the highest average and was valedictorian.

The prairie dogs stayed out of school and fought the tax levy because the administration would not add digging and burrowing to the curriculum. They apprenticed their children to a badger and later joined the groundhogs and gophers to start a successful private school.

SOURCE: Reavis, G. H. "The Animal School." *Educational Forum*, vol. 17.2, 1953, p. 141. Reprinted by permission of Kappa Delta Pi Honor Society in Education.

individualized instruction. Which of these or others are the most important, however, is up to future research to determine. Two types of task modifications will be explored: task content modified to coincide with what students are ready to learn and task processes and features modified to match how students prefer to go about learning.

Matching Task Content to What Students Are Ready to Learn

The comment, "my child can't learn anything" is commonly heard. Yet there is no such thing as a child who can't learn anything. Perhaps the child can't learn what we're trying to teach, but he or she certainly can learn more fundamental skills that are easier. If task content is matched to what the child is absolutely ready to learn, then the learning process will be facilitated. Achievement of the higher level goals will occur more rapidly and completely if the content upon which they rely is taught first (Kinsbourne & Caplan, 1979).

We must guard against teaching too much, too soon, thereby bypassing mastery of more important basic skills. What tends to be learned from such teaching are faulty habits that only need to be unlearned later on. The child who has put too much effort into learning and continually fails ultimately may lose

motivation to achieve. Consequently, teaching the appropriate material at the right time is essential.

Our school texts' scope and sequence charts offer a general guide for choosing instructional objectives for our students. But how do we know exactly what from these tables a child is ready to learn? We discover this by including several important procedures in our diagnostic-prescriptive teaching process: task analysis, evaluation of past opportunities for learning, and consultation with the child.

Task Analysis

Task analysis involves analyzing into easier steps the exact content of each task that the child is having difficulty mastering. We note which steps the child already has mastered. The student is then ready to be instructed on the next harder step. This process leads to valid instructional approaches because the conclusions are gained from actual teaching objectives, an advantage that most formal tests don't have (Gagné, 1970; Junkala, 1972, 1973).

Tasks also can be analyzed along process dimensions. For example, it is helpful to divide the content into that which must be mastered through visual or auditory input, and expressed through talking or writing. Virginia Sperry (1974) lists other very useful dimensions to consider when analyzing tasks from most to least difficult: external to internal com-

Table 1

Task analysis of letter-naming

	MODALITY		
	INPUT	OUTPUT	TASK REQUIREMENTS
Memory			
recall	auditory-motor		write the letter "C" when "C" is dictated by the teacher
recall	visual-oral		read the letter "C" when presented on a card
recognition	auditory-motor		teacher says "C"; student points to the "C"
recognition	visual-oral		teacher points to a "C" and asks "is this a "C"; student responds yes or no
No Memory			
discrimination	visual-motor		student matches the "C" with another "C" among several distractor letters
discrimination	auditory-vocal		teacher says "C — C " are they the same or different? "C — P" are they the same or different?; student responds
repetition	auditory-vocal		teacher says "C"; student repeats "C"
repetition	visual-motor		student copies a model of "C"

Easier ← → Harder

Smith (1983, p. 412)

munication, social to nonsocial situations, abstract to concrete materials and responses, verbal to nonverbal materials and responses, symbolic to nonsymbolic materials and responses, sequential to static items and responses, long term recall to short term memory to no memory.

A sample task analysis for letter naming is presented in Table 1. It analyzes the task from hardest to easiest and with reference to the modalities and memory skills required. Any instructional modifications resulting from such a procedure are appropriate for that one child on that one task. The assumptions upon which these modifications are based may not be appropriate for the same child on other tasks or different children on the same task (Levin, 1976). Such task analyses help to determine both remediation methods and "compensatory" instructional approaches that use the child's strengths to work around the weaknesses so as to facilitate continued success.

Take seven-year-old Allison, for example. Allison's multidisciplinary assessment had concluded that she was delayed in expressive language skills. She was unable to name letters of the alphabet other than those that appeared in her name.

Allison's teacher was confused because she found that Allison could repeat letter sounds and match and copy letters accurately, but couldn't seem to remember them. She then task-analyzed "letter naming" and found that Allison did

remember a great deal about letter names. Her problem was that she remembered in a different way from the way the teacher was asking her to remember. That is, when the teacher named letters for her and she was asked to point to them, Allison demonstrated 100 percent accuracy. Her difficulty seemed related to retrieval of isolated sounds from memory.

This task analysis of letter naming suggested that the teacher should experiment with methods that paired Allison's weaker naming skills with her stronger motor expression and visual/auditory reception skills. The teacher pursued her diagnostic-prescriptive teaching by having Allison draw, trace, paste, construct and copy letters as she named them and as Allison repeated their names. Since Allison could distinguish the sounds of initial consonants in each word well, the teacher tried relating the letter form to a word that began with the same letter and also had its shape. "Snake" begins with an "ss" sound, a snake can be shaped into an "s," and the letter "s" can be superimposed on it. This method seemed to work well. When seeing letters that she had been taught, Allison seemed to rely on that visual image to discern the word's initial consonant sound and then translate this into the letter name. As her degree of mastery of letter names increased, her retrieval efficiency also increased. Allison was not introduced to phonetic reading until she became more proficient in retrieving the sounds of letters.

Instead, she was taught to compensate for her disability by learning to recognize words by sight from their visual configurations.

Evaluating Previous Learning Opportunities

Evaluation of the instructional objectives to which a student previously has been exposed is essential to understanding his or her present capabilities. When considered together with the effort involved in attempting to teach the student skills that he or she hasn't mastered, evaluating past learning opportunities offers a valuable perspective on the reason for and degree of modifiability of the child's weaknesses.

Josh is a good example of the benefits that come from evaluating previous learning opportunities. Josh is a 12 year old, very bright young man attending a private school with other bright youngsters. His reading, math, and comprehension skills are excellent. However, due to terrible spelling, Josh's teachers had asked his parents to have him evaluated for a learning disability. Trial teaching approaches were used during the evaluation and no difficulty with learning to spell either phonetic or nonphonetic words could be found. Josh learned well with typical teaching methods and even was able to generalize spelling forms learned on one word to new

words (e.g. commercial - superficial). When these findings were explored with his teachers, they commented, "but we never teach spelling as a subject; these children just pick it up." Unfortunately, this one student did "soak up" most information, but not spelling. Josh's need for directed teaching in spelling helped to explain his poor spelling achievement and direct his teachers to implement a formal spelling curriculum. What initially looked like a disability was largely due to lack of opportunity to learn.

Consulting the Child

It is impossible to know for sure what is going on in a child's mind. We might observe a child's task execution in fine detail, and analyze his or her successes and errors. However, our conclusions are still only hypotheses. Why not make the child a partner in the evaluation process and ask the student how he or she goes about solving the task? This often proves to be a beneficial learning situation for both teacher and child.

Consider Jennifer, for example. Jennifer was referred to her school's multidisciplinary team by her third grade teacher because of poor classroom progress, despite adequate intelligence and a family background that valued and encouraged educational achievements. The team's assessment results indicated approximately a one-year lag in all school subjects,

though no striking language, visual perceptual, or motor deficits were evident. What seemed clear to the team was a marked immaturity in application of learning strategies that would aid organization and recall of information.

In order to investigate Jennifer's learning strategies further, the LD teacher simulated a common independent classroom assignment. She instructed Jennifer to go to another table and study ten new spelling words. Jennifer was not to return until she felt she had mastered all the words. Hardly did the teacher have time to begin observing Jennifer's task approach, than Jennifer returned, proud to announce completion of the assignment. The LD teacher tested Jennifer and found that she could spell only three of the ten words. She then asked Jennifer, "tell me what you were doing while you were studying?" Jennifer replied that she had recited each word's letters once while looking at the words. Then she repeated this activity again. To her, twice through meant "learned." Jennifer's reflections were very important because they indicated that she does indeed employ learning strategies. What she seems not to be doing is getting herself actively, cognitively involved with the information and then evaluating whether more practice is necessary.

As a result of consulting with Jennifer, whose thinking processes the teacher was attempting to second guess, the teacher felt confident that Jennifer would be able to indepen-

dently follow specific learning strategies offered to her. However, the focus of these strategies would have to be forcing more active involvement with tasks, such as through use of visual imagery, more intense verbal mediation, associations, questioning techniques and modeling of Meichenbaum's (1976) self-instructional methods.

Matching Task Strategies to How Students Prefer to Learn

Having discovered what our student is ready to learn, we can not assume that the child will automatically be able to absorb the material we present. Myklebust and Boshes' (1969) well-known study, as have many others, conclude that there is "a difference in [LD children's] psychology of learning which appears critical in planning for special education" (p. 142). Our student may have unique ways of going about learning that make it easier for him or her to master material when presented in one way than in another. Since we wish to acquaint our students with as much information as possible, we may as well alter our tasks in such a manner as to best match how they learn.

Several task modification strategies are presented in the following pages to illustrate how we might meet some of the unique learning characteristics of LD students: difficulty

focusing and sustaining attention, internally vs. externally controlled cognitive styles, slow information processing speeds, overloading with certain amounts and types of practice, modality strengths and weaknesses, impulsivity-reflectivity, need for directed instruction, tendency not to generalize learning from one task or setting to another, need to have teachers' instructions match students' learning styles, and need to be taught learner strategies.

After deciding on several possible approaches to teaching, it is wise for the teacher to offer the student a choice of methods. Allowing students to choose among equally acceptable alternatives often is associated with more rapid gains than if student preferences are not considered (Kosiewicz, Hallahan, & Lloyd, 1981).

Matching Tasks to Children's Attending Strategies

Since learning disabled children's attention often varies from one time to another, teachers may perceive students' capabilities as greater than they really are. Having done it once, we tend to believe that they could do it again if they wanted to. Well, many children can not do it again even if they wanted to. They need to have their attention facilitated by the settings they are in, or engaged by task characteristics, instructions, and explanations that draw their interest and participation more than do distractors.

Maximizing Setting Variables that Sustain Attention. Children's attention and corresponding activity levels vary greatly across settings. Even a hyperactive child is not always hyperactive. For example, Kalverboer's (1976) observations of 117 children in six different situations found only one child who was consistently among the 20% most active in each setting. Therefore, teachers must observe children carefuliy and define that environment in which each has the greatest opportunity to maximize his attention. Having identified an environment that is ideally suited for instruction, similar environments should be considered when making placement decisions. In addition, experiential type learning activities that take place out of the traditional classroom often maximize learning by taking advantage of the student's greater motivation, interest, active participation and sense of relevancy to daily life (Coleman, 1977; Hamilton, 1981).

Maximizing Task Variables That Facilitate Substained Attention. Instructional variables tend to influence LD students' learning more so than for their peers. They often require reduced stimulus complexity and response competition. For example, Bryant, Drabin and Gettinger (1981) found that LD children were better at learning to associate geometric figures with nouns when only one figure (vs. all) appeared on a card and when mastering one pair at a time (instead of

running through all items on the list until mastery was reached). The LD students' more marked improvement under conditions of reduced visual complexity and response competition reflects their greater sensitivity to such task variables than typical learners.

Since it is common for LD children's attention to become overloaded when they have to attend to more than three to five elements or ideas at a time, success can be facilitated by determining the optimum unit size for each pupil and limiting the material accordingly. For example, Bryant (1980) has found that temporarily dropping learned items from lists of new items reduces the amount of response competition the student experiences and facilitates mastery. In another study, Bryant, Drabin, and Gettinger (1981) tried to teach LD students three spelling words on each of three consecutive days. They found that 62% of the students learned to criterion. However, when students were given one or two additional words to learn per day, the percent reaching criterion on the original 9 words decreased to 30% and 17% respectively. Bryant's research suggests that the optimal unit size for instruction may be five words for reading but only three for spelling (Bryant, 1980).

The attentional value of tasks' perceptual features also is important to evaluate because LD children often will rely exclusively on the perceptual characteristics of materials

instead of using their past knowledge to think through solutions (Reid, 1980). For example, many learning disabled children are distracted by the pictures in their reading books. They gather comprehension clues from the pictures and then guess at the words rather than attempting to decode them. Consequently, in some cases word recognition gains are more rapid if pictures are eliminated. Likewise, the reduction of similar items that may prove confusing is often necessary (e.g. don't teach b at the same time as d) since the presence of similar information may distract the LD youngster more so than the typical student from learning the intended material (Cermak & colleagues, 1981).

Our academic tasks also can be structured in such a way as to draw a child's attention toward those features that are important to attend to. For example, children will find the horizontal discrimination between b-d much easier if the two are lined up, one on top of the other $\frac{b}{d}$, rather than side by side (Pick & Pick, 1970). Another way to build attention-getters into tasks is by using the child's preferences for color, shape, size, or three dimensional objects to aid concept attainment (Odom & Corbin, 1973; Suchman & Trebasso, 1966). For example, when teaching the difference between the letters N and M, materials can be made more distinctive by varying the sizes (big N and small M), shapes (the N is pasted on a square background and the M on a circular background),

colors (red N and yellow M), or dimensionality (use blocks with the letters painted on them rather than letters written on paper).

Another manner of engaging sustained attention is to cluster information to be learned into conceptual categories for LD children (Cartelli, 1978; Torgesen, 1978) or to build association values into tasks (Senf, 1969). For example, Suiter and Potter (1978) found that learning disabled children recalled 40 pictures of objects better when they were shown the pictures in groups of four objects belonging to the same category (e.g. food, household items, animals, toys) than when shown four pictures at a time, but no two belonging to the same category.

Finally, how children are instructed to interact with materials greatly impacts upon attention. For example, if we build labelling into tasks the memory performance of some learning disabled students may become equivalent to that of typical learners (Torgesen & Goldman, 1977). Similarly, memorization is aided by having students sort the materials into categories (Torgesen, 1977) and by having instructors draw students' attention to the distinctive features to be learned (Koenigsberg, 1973).

The experienced teacher has discovered many additional means for increasing focussed attention and learning. Some of these include the teacher instructing the student to apply new

ideas to practical problems in a different setting (Dechant, 1973), use mnemonic tricks (e.g. the first letters of every good boy does fine name the treble cleft lines), pair words for memory, actively question during reading, review material periodically, immediately rehearse what has been seen or heard, and attend to the organization of the information presented (Kaluger & Kolson, 1966).

Matching Incentives to Internally and Externally Controlled Cognitive Styles

Nothing maximizes attention like a highly motivating learning situation. This motivation can come from outside factors (extrinsic motivation) or inside the child himself (intrinsic motivation). Externally controlled children hold outside factors responsible for success and failure (e.g. I got an F because the teacher hates me). Internally controlled children, on the other hand, feel that they personally control success and failure (e.g. I deserved an F because I went to the movies instead of studying). Internally controlled children usually are self-motivated to try hard, although they also will work for external rewards. Since many of our learning disabled students are externally controlled, we need to offer them immediate, consistent external incentives for achievement while helping them gain more internal motivation.

Extrinsic incentives will help children who avoid challenges put more effort into learning. Point systems that reward children for improved attention and learning have particularly powerful effects upon learning rate (Brigham, Graubard & Stans, 1972; Heiman, Fischer, & Ross, 1973). Often these points are accumulated and then traded in for a prize. To illustrate, in one study that used pennies as reinforcers, increases were found in selective attention and spontaneous use of verbal rehearsal strategies, as well as recall (Hallahan & colleagues, 1978). In another study, daily reinforcement of a whole classes' decreased reading error rate was just as effective as graphing and reinforcing each individual's daily progress, but more economical timewise and easier to implement (Thorpe, Chiang, & Darch, 1981).

Other examples of extrinsic motivators include charting of successes, earning stars or candy, praise, and contracting. Contracting is particularly useful because the youngsters actually makes their own decisions as to what they will attempt to achieve. They then choose their own "pay-offs". These positive consequences serve as strong incentives to put effort into least favored learning activities.

External reinforcement also can come from classroom materials and requirements that are highly motivating. For example, though 12 year old Bobbie had excellent decoding skills, his comprehension could vary anywhere between 40% and

100% whether on a first or sixth grade level passage. This variability greatly concerned his teachers because he was at times absorbing less than half of the information they were presenting. Therefore, they administered an interest inventory and found that he was enthusiastic about sports and outer space. When Bobby then was asked to read passages on these topics he consistently demonstrated 95-100% comprehension, even if the passages had a 6th grade reading difficulty. Although high interest materials would be ideal for Bobby all day long, in reality he does have to deal with material that lacks interest for him. Therefore, high interest reading materials were used as often as possible and alternative extrinsic motivators were added to lessons at other times.

As Bobby's case illustrates, a child's response to extrinsic motivators is a very individual thing. We must search for the incentive that best matches the child's interests, for not every method will induce all children to put more energy into learning.

Clearly, the best form of motivation comes from within the child. However, when school learning comes hard to children, they often blame their failure on external factors or on being inferior human beings, factors that do not promote internal motivation. Table 2 describes why, in extreme cases, LD children may find it safer to expect little, try nothing, and be helpless (Dweck, 1975). This "learned helplessness" can

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Table 2

Student motivation as related to the [illegible] process

	TYPE OF ACHIEVEMENT RELATED TO EXPECTATIONS OF SOCIETY AND SCHOOLS	TYPE OF ADULT FEEDBACK ATTRIBUTION MADE BY CHILD	TYPE OF AFFECT ASSOCIATED WITH INTERNAL EVALUATION OF PERFORMANCE	CHILD'S UNDERSTANDING OF HIS ROLE IN CAUSE-EFFECT RELATIONSHIPS	EXPECTATIONS AND PROBABILITY OF SUBSEQUENT BEHAVIOR
High achiever	Success is positively valued by our society. Success is defined by schools as desirable.	Positive feedback from adults. The child receives positive labels such as smart, gifted, etc. Child accepts and internalizes positive labels. The cause of success is attributed by the child to ability and effort.	The positive affects of pride, accomplishment and competence is associated with successful performance. The child self-reinforces his performance with internal positive self-statements. The child's self-concept is enhanced.	The child perceives that his effort determines positive outcome. Energy is seen as a means of solving problem.	The child has expectancy of success for future performance. Increased probability of future success serves as an incentive to work harder.
Low achiever	Failure is negatively valued by our society. Failure is defined by schools as undesirable.	Negative feedback from adults. The child receives negative labels such as slow, learning problems, etc. Child accepts and internalizes negative labels. The cause of failure by the child is attributed to lack of ability.	The negative affect of frustration, shame, indifference, and incompetence is associated with failure. Internal statements of the child are primarily negative reflecting his lack of ability. The child's self-concept is decreased.	No causal relationship is perceived between effort and outcome by the child. Therefore, the child considers effort a waste of energy. Energy is spent on avoiding the task.	The child has expectancy of failure in future. Increased probability of failure, therefore, no incentive to expend effort.

SOURCE: Grimes, L. "Learned Helplessness and Attribution Theory: Redefining Children's Learning Problems." *Learning Disability Quarterly*, 1981, 4 (1), p. 92. Reprinted by permission.

begin to be turned around by the kind of feedback teachers give children.

If teachers can help children to attribute failure to something other than external sources and their own self-worth, then interest, enthusiasm, and motivation to put energy into learning may be regained. This is why Dweck (1975) suggests that teachers attribute children's successes and failures to amount of effort put into learning, which reduces self-criticism and shifts attention to what can be done to achieve. As success increases, a gradual shift back to self-attributions for improvement may occur (Bandura, Jeffery, & Gajdos, 1975). Positive self-attributions are an important goal if we wish to encourage a style of interacting with the world that is oriented toward doing one's best.

Matching Tasks' Time Limits to Information Processing Speed

There is increasing sensitivity to the differences between children in information processing time. If they need longer periods of time to solve certain types of problems, then they will be penalized by timed assignments and tests. Time limits must be decided upon that give the youngster a reasonable opportunity to show his or her knowledge. In addition, time limits on new learning within the classroom must be sufficient to allow opportunities for labelling and verbal rehearsal and

for small chunks of information to be learned at separate intervals so as to avoid overloading.

Matching Number of Task Repetitions to Learner's Ability to Profit from Practice

We often labor under the assumption that "practice makes perfect". But it's not always do so for the learning disabled. For example, poor readers may get worse with continuous practice on motor tasks (Wozniak, 1975) or when scanning their memories for auditory information (Farnham-Diggory & Gregg, 1975). Even switching from one to another modality may not create the expected recovery effect. Therefore, we must be careful that the number of repetitions of tasks assigned to students at any one time does not overwhelm and exhaust them. The teacher also must consider what amount of overlearning is needed by each pupil, at what intervals and what types of review best speed up the overlearning process.

Matching Tasks to Students' Stronger Modalities

While the idea of matching task attributes to youngsters' stronger information processing modalities makes intuitive sense (e.g. teaching an auditory learner through a visual reading approach), the research literature is inconsistent in supporting this practice. Studies generally indicate that these matches produce either greater or no greater learning

rates than mismatches (Bateman, 1968; Robinson, 1968; Hagan, 1971; Levin, 1976; Wheeler & Dusek; 1973). This occurs because one's preferred modality may direct learning, even if the method of teaching capitalizes on the weaker modality; and because every method teaches regardless of whether it matches the stronger or weaker modality (Tarver and Dawson, 1978). In addition, we must recognize that some subject areas are just not flexible enough to permit tasks to be altered to match a child's stronger information processing channel. Discussion of whether we should teach through children's stronger modalities will continue until researchers begin to run well-designed studies that identify similar types of learners and expose each child to all methods for time intervals that are long enough to permit differences in classroom learning to show up.

Matching Tasks to Student Cogntive Style

Research has indicated that since children may not be able to break away from their preferred way of perceiving and interacting with their environments, learning can be facilitated when teachers alter their materials and methods so as to be congruent with student cognitive styles (Beller, 1967; in Coop & Sigel, 1971). Let us explore how task attributes may be modified to better match the cognitive styles of impulisive-reflective and low-high conceptual level students.

Children with impulsive conceptual tempos do not stop to reflect on correct alternatives. This tendency is in part due to their global approach to tasks, which takes less time than studying each detail. Given that our educational tasks usually ask for detail analysis, the true capabilities of the impulsive student may not be tapped a good deal of the time. Consequently, tasks must be modified so as to utilize the child's preferred style for problem solving whenever possible, while also minimizing the style's interfering effects. For example, attention to details might be facilitated by having the child skim the pictures and use the text's main ideas to guess the details; the student would then check the passage to see whether he or she was on target. Pictures might be covered over on a page so that the student is forced to attend to the individual words and phrases to derive meaning. Children also might correct their own papers, underline word endings, and outline stories to help them adapt their attention to the more detail-oriented, longer response time strategy that schools emphasize.

Interestingly, the school's bias in favor of the reflective student does not mean that this child always has an easy time of it. The reflective style may make one take longer to discover main points and may be a disadvantage on speed drills and games calling for more rapid information processing (Coop & Sigel, 1971). It is also a clear disadvantage on timed

tests when, for example, students spend too much time pondering the ramifications of every multiple choice.

Many learning disabled children are low conceptual level students. During learning they prefer structured tasks and externally imposed rules. They have difficulty generating their own concepts and considering alternative solutions. For these youngsters, teaching of pertinent facts and key concepts, giving rules before instead of after examples, and lecture rather than discovery methods match their styles and promote more rapid learning. Hunt's (1974) work suggests that these methods may be just what the problem learner needs in order to promote greater integration of information, generalization, and order in learning. That is, if instead of asking children "what do you think?" we would expand their thinking by giving them more alternatives to consider, then we would be increasing their conceptual flexibility and not be leaving the acquisition of information to chance.

By offering children direction on what to attend to and how to think, we in effect give students more options with which to think intelligently. For example, Bendell, Tollefson and Fine (1980) found that externally controlled LD students learned spelling words better when told precisely how to study (e.g. trace word with finger, write it three times as you whisper the letters and words). In contrast, internally controlled LD students did not require such task structure and

profitted best when given the low-structure instructions to just learn the words. Clearly, children benefit when instructions are well-matched to their cognitive styles.

Building Generalization into Tasks

Since we can't expect that a child automatically will transfer information to appropriate situations, teachers are responsible for making sure that new learning is generalized (McLeskey, Rieth, & Polsgrove, 1980). How are students to remember to transfer headings taught in English class to math assignments, or to apply a math operation learned in the resource room to classroom assignments?

First of all, in order not to waste very important time, we must make sure that what we are teaching has maximal transfer value to our academic goals (Gagné, 1970). Stokes and Baer (1977) suggest several additional ways in which generalization might be enhanced:

1. Students should be taught to cue teachers to reinforce their use of appropriate task strategies.

2. Teachers should use many examples to deepen application of learned skills.

3. Teachers should use consistency and structure in initial teaching but later vary formats, procedures, and examples to promote generalization.

4. The same information should be instructed by many people, in many settings and conditions.

5. Teach initially using a consistent reinforcement schedule but then change to delayed and intermittent reinforcement.

6. Students should be told to generalize using verbal mediation.

7. Students should be instructed to self-report generalization and to apply self-recording and self-reinforcement techniques.

8. Information should be taught in connection with naturally occurring stimuli (peers, physical stimuli).

Matching Teacher Instructions to Students' Learning Strategies

Teachers can improve students' accuracy on tasks if they are careful to match their own behaviors to students' preferred learning strategies. For example, Coop and Sigel (1971) point out that the impulsive teacher may overwhelm the reflective student by a constant barrage of information. On the other hand, the reflective teacher's slow paced, detailed approach may bore the impulsive student. For the student who profits best from directed instruction or who becomes overloaded with a barrage of materials and verbal directions, brevity, simplicity, and directness are important; excess,

irrelevant, and distracting information such as interesting tangents need to be eliminated.

It is also important that the directions given by teachers, textbooks, and tests match, so that students have one consistent strategy to follow (Faulk & Landry, 1961). If the way in which students are asked to complete similar assignments varies from time to time, this may confuse some of them and ruin their previous "mental sets". On the other hand, the same variability will excite and motivate others. Consider Teddy for example. Teddy had been held back a grade once and is now in a fifth grade classroom. He is being instructed in reading at a beginning third grade level and is progressing well in a series that teaches reading through word families (sat, bat). Math, always a strength for him, is suddenly becoming troublesome. Teddy can solve the multiplication problems that the teacher drills on the blackboard, but his homework papers contain many errors on similar types of math operations. A comparison of the boardwork and homework assignments shows that the latter depend on independent reading of directions and word problems, whereas the boardwork does not. Eliminating the need to read independently by having Teddy's parents read the problems and directions to him, helped him achieve well in math once again.

As children get older they become more able to operate at higher levels of conceptual complexity, reflectivity, and

independence. Teachers need to help each child move to higher conceptual levels as he or she becomes ready. Both teacher directions and teacher styles can help accomplish this goal. Yando and Kagan (1968), for example, found that students taught by reflective teachers showed greater increases in reflective style than did those taught by impulsive teachers. Similarly, Scott and Sigel (1965; in Coop & Sigel, 1971) report that on an end of the school term cognitive style test, children tended to respond in the same inquiry or directed style as they had been instructed in science. Coop and Sigel (1971) suggest that, since a child may not be able to break away from his preferred mode of perceiving a situation, teachers explain content from a perceptual framework that accommodates the child's style, while also trying to guide him toward more appropriate styles.

Teaching More Efficient Learning Strategies

Noting the positive impact that task modifications can have on the performance of learning disabled children, some individuals believe that many of these students are impaired at the level of learning strategies rather than basic ability to learn (Adelman, 1971; Alley & Deschler, 1979; Torgesen, 1980). Since the way in which they go about learning is inefficient, if we teach these youngsters more efficient use of

their cognitive abilities, they will learn more intelligently. This approach has longer lasting possibilities than continually modifying task characteristics. Learning strategies are most effective when self-generated because they comfortably match the individual's learning style (Hagen, 1971; Levin, 1976). However, if the student doesn't self-generate these approaches as he gets older, they need to be taught. Early adolescence has been suggested as a prime time for such instruction because the students are developmentally mature enough to profit from and apply the teaching (Rohwer, 1971).

Smith (1983) discusses visual imagery, verbal mediation, search strategy training, modeling, error detection training, clustering, mnemonic tricks, questioning techniques, distributed practice, and use of associations as methods that have helped youngsters learn to attend spontaneously to the appropriate elements of their assignments, organize them for recall, and then retrieve them.

Conclusions

Teachers must be involved in ongoing evaluations of their instructional approaches because the LD student's progress depends upon how his or her unique characteristics interact with what is taught and how it is taught. When the nature of

classroom tasks are well-matched to what the child is ready to learn and how he or she prefers to go about learning, learning progress can be maximized. It is also fruitful to teach the child more efficient ways of approaching problem solving. It is the potential of such task modifications that give practical meaning to our scrutiny of individual differences in children. For a fuller account of the concepts appearing in this paper, the reader is advised to consult Smith (1983).

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